# Literature Survey

## The following works were carried out by specific persons in the area of smart waste management

**A Survey on Smart Garbage Management in Cities using IoT**
***Ruhin Mary Saji***
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The garbage management in cities has to be effectively andefficiently implemented. The various proposals were putforward and some of them already implemented. But itcannot be considered as an effective one. So a survey wasdone among different proposals and this survey paperincludes survey among different methods for smart garbagemanagement in cities using IoT.The paper [1] Smart Garbage Management in Smart Citiesusing IoT proposed a method as follows. The level ofgarbage in the dustbins is detected with the help ofultrasonic sensors system, and communicated to theauthorized control room through GSM system. Arduinomicrocontroller is used to interface the sensor system withGSM system. A GUI is also developed to monitor thedesired information related to the garbage for differentselected locations. This will help to manage the garbagecollection efficiently. Level detector consists of IR sensorswhich is used todetect the level of the garbage in thedustbin. The output of level detector is given tomicrocontroller. Four IR sensors are used to indicate thedifferent levels of the amount of the garbage collected in thedustbin which is placed in public area. When the dustbin isfilled up to the highest level, the output of fourth IR receiverbecomes active low. This output is given to microcontrollerto send the message to the Control room via GSM module.At receiver, control room is present where all the activitiesare managing. At receiver, control room is present where allthe activities are managing. This system assures the cleaningof dustbins soon when the garbage level reaches

itsmaximum. If the dustbin is not cleaned in specific time, thenthe record is sent to the higher authority who can take
system also helps to monitor the fake reports and hence canreduce the corruption in the overall management system.This reduce the total number of trips of garbage collectionvehicle and hence reduce the overall expenditure associatedwith the garbage collection. It ultimate helps to keepcleanness in the society. Therefore, the smart garbagemanagement system makes the garbage collection moreefficient.Another method for garbage management is introduced [2]as follows. A dustbin is interfaced with microcontrollerbased system having IR wireless systems along with centralsystem showing current status of garbage, on mobile webbrowser with html page by Wi-Fi. Hence the status will beupdated on to the html page. There by to reduce humanresources and efforts along with the enhancement of a smartcity vision. Considering the need of modern technology, thesmart garbage bin can expensive but considering the amountof dustbin needed in India, there for they used based sensorsto reduce its cost and also make it efficient in applications.And at the sender side they used only a Wi-Fi module tosend and receive data. But because of the use of weightsensor for detection of amount of garbage in dustbin. It willonly detect the weight of waste; not how much level it is of.The message can be sent directly to the cleaning vehicle
instead of the contractor's office. Thus garbage bins are managed.A Geographical Information System (GIS) transportationmodel for solid waste collection that elaborates plans forwaste storage, collection and disposal has been proposed in[3] for the city of Asansol in India. An enhanced routing andscheduling waste collection model is proposed for theEastern Finland, featuring the usage of a guided variableneighborhood thresholding metaheuristic. The aim of theresearch was to develop an optimal schedule for trucks ondefined collection routes. The data from the bins areprocessed in the DSS and if it is correct it is sent toorganizers of waste collection in this particular place and tothe road police. The truck driver doesn't waste time forwaiting, he/she goes to the next point and the route isdynamically recounted. When the problem is solved the

**Adil Bashir, Shoaib Amin Banday, Ab.Rouf Khan and Mohammad Shafi,** "Concept,Design and Implementation of Automatic Waste
Management System",

[1] in this paper authors integrated to use as Smart Trash System embodies an electronic device known asSmart Trash Bin which consists of Sensors (Load sensor and IR proximity sensor) and aRadio Frequency (RF) transmitter. An automated GSM module, Load sensor, Microcontroller, DC motor, LCD, Web Camera, and Power supply are the essentials for collection, monitoring, and management of garbage. Implementation of this project
helpsin avoiding overflow of garbage from the container in a residential area which is previously either loaded manually or with the help of loader in traditional trucks. Itreduces the productivity of the vehicles and manpower deployed and thereby helps inminimizing the threat to the health of the sanitation workers as the waste is highlycontaminated.

**Chowdhury and M. U. Chowdhury,**
"RFID-based real-time smart wastemanagement system,"

[2] in this paper, some smart trash research consider "pay as youthrow'" weight-based billing for residential collection, which could motivate residents toreduce their waste. It uses the load sensor.

**F achmin F olianto, Y ong Sheng Low and Wai Leong Yeow,**

"Smartbin: Smart WasteManagement System",[3] This paper presents a system which is designed to collect datausing the ultrasonic sensor and to deliver the data through the wireless mesh network.
Thesystem also employs a duty cycle technique to reduce power consumption and tomaximize operational time. The Smart bin system was tested in an outdoor environment.Through the testbed, we collected data and applied sense-making methods to obtain litter bin utilization and litter bin daily seasonality information. With such information, litter bin providers and cleaning contractors are able to make better decision to increase productivity.

**Dr. K. R. Nataraj and Meghana K. C**
, "IOT Based Intelligent Bin for Smart Cities",[4]The proposed system concentrates on eradicating the issue of ignorance of cleanlinesswhich is spoiling our environment and then reduce it. The smart trash consists of twosensors namely IR and gas sensors. The IR sensor placed inside the trash to sense thelevel of trash and gas sensor will sense the toxic gases. Once the trash is filled, alarmrings.

**S.S.Navghane, M.S.Killedar, Dr.V.M.Rohokale,**
"IoT Based Smart Garbage and WasteCollection Bin",[5] this is not an original idea, for the implementation of smart
garbage bin; the idea has existed for many years, After the IoT field finding its grip in our lives.This is an original plan for designing a smart garbage bin with a weight sensor, IR sensor and Wi-Fi module for transmission of data. This system assures the cleaning of dustbinssoon when the garbage level reaches its maximum. If the dustbin is not cleaned in aspecific time, then the record is sent to the higher authority who can take appropriateaction against the concerned contractor. This reduces the total number of trips of garbagecollection vehicle and hence reduces the overall expenditure associated with
the garbagecollection.

**Gaikwad Prajakta, Jadhav Kalyani, Machale Snehal**
, "Smart Garbage CollectionSystem in Residential Area",[6] automatic garbage collection and information gatheringsystem which is based on Image processing as well as on GSM module. The mainconcept is that a Camera will be placed at every garbage collection point along with theload cell sensor at the bottom of the garbage can. The camera will take continuoussnapshots of the garbage can. A threshold level is set which compares the output of the

camera and load sensor. The comparison is done with the help of microcontroller. After analyzing the image, we get an idea about the

level of garbage in the can and from theload cell sensor we get to know the weight of garbage. Accordingly, information is processed and checks if the threshold level is exceeded or not. The controller sends amessage with the help of a GSM module to Garbage collection local central office tonotify that garbage can be exceeded its capacity and disposal of waste is required. Accordingly, the authority sends the garbage collecting vehicle to collect the garbage,which is done with the help of a robot mechanism which tilts the can.

**Vishesh Kumar Kurre,**
"Smart Garbage Collection Bin Overflows Indicator using IOT",[7] in this a sensor (Infrared sensor/proximity sensor) Is placed under the dustbin. Whenthe sensor signal reaches the threshold value, a mail notification (like email, twitter,WhatsApp message) will be sent to the respective Municipal / Government authority person. We can also see the density of the Dustbin through the inter net on a Dashboard,this is a GUI (Graphical User Interface) dashboard so any of the authenticate person willeasily check the present condition of the dustbin. So then that person can send the collection vehicle to collect the full garbage bins or dustbin